BRAKE SYSTEM

Description

The hydraulic braking system is a dual line type, incorporating primary and secondary hydraulic circuits.

NOTE: References made to primary or secondary do not imply main service brakes or emergency brakes but denote hydraulic line identification.

The brake pedal is connected to a vacuum assisted mechanical servo which in turn operates a tandem master cylinder. The front disc brake calipers each house four pistons, the upper pistons are fed by the primary hydraulic circuit, the lower pistons by the secondary hydraulic circuit. The rear disc brake calipers each house two pistons, these are fed by the secondary hydraulic circuit via a pressure reducing valve.

A brake fluid level switch is incorporated into the reservoir cap assembly, the switch having detected either low or sudden fluid loss will immediately illuminate a warning light in the instrument binnacle.

The brake fluid reservoir is divided, the section closest to the servo feeds the primary circuit and the section furthest from the servo feeds the secondary circuit. Under normal operating conditions both the primary and secondary circuits operate simultaneously on brake pedal application. In the event of a failure in the primary circuit the secondary circuit will still function and operate front and rear calipers. Alternatively, if the secondary circuit fails the primary circuit will still function and operate the lower pistons in the front calipers, allowances should be made and vehicle speed adjusted accordingly to allow for the lack of full braking efficiency.

If the servo should fail, both hydraulic circuits will still function but would require greater pedal effort due to the lack of vacuum assistance.

The hand operated parking brake acts on a brake drum at the rear of the transfer gearbox and is completely independant of the hydraulic circuits.

Brake pad wear sensors are incorporated in the front and rear right hand side inboard brake pads. The sensors will illuminate a brake pad wear warning light in the instrument binnacle, when pad thickness has been reduced to approximately 3mm (0.118 in).

To assist cooling, ventilated brake discs are fitted to the front brakes on vehicles where asbestos free friction pads are used. Since the ventilated disc is wider than a standard disc, a distance piece is fitted between the caliper halves to accomodate the extra width.

CAUTION: THOROUGHLY CLEAN ALL BRAKE CALIPERS, PIPES AND FITTINGS BEFORE COMMENCING WORK ON ANY PART OF THE BRAKE SYSTEM. FAILURE TO DO SO COULD CAUSE FOREIGN MATTER TO ENTER THE SYSTEM AND CAUSE DAMAGE TO SEALS AND PISTONS WHICH WILL SERIOUSLY IMPAIR THE EFFICIENCY OF THE BRAKE SYSTEM.

To ensure the brake system efficiency is not impaired the following warnings must be adhered to :-

DO NOT use any petroleum (gasoline) based cleaning fluids or any proprietary fluids containing petroleum (gasoline). The prefered fluids are clear methylated spirits, industrial alcohol or a proprietary brake cleaning product.

DO NOT use brake fluid previously bled from the system.

DO NOT use old or stored brake fluid.

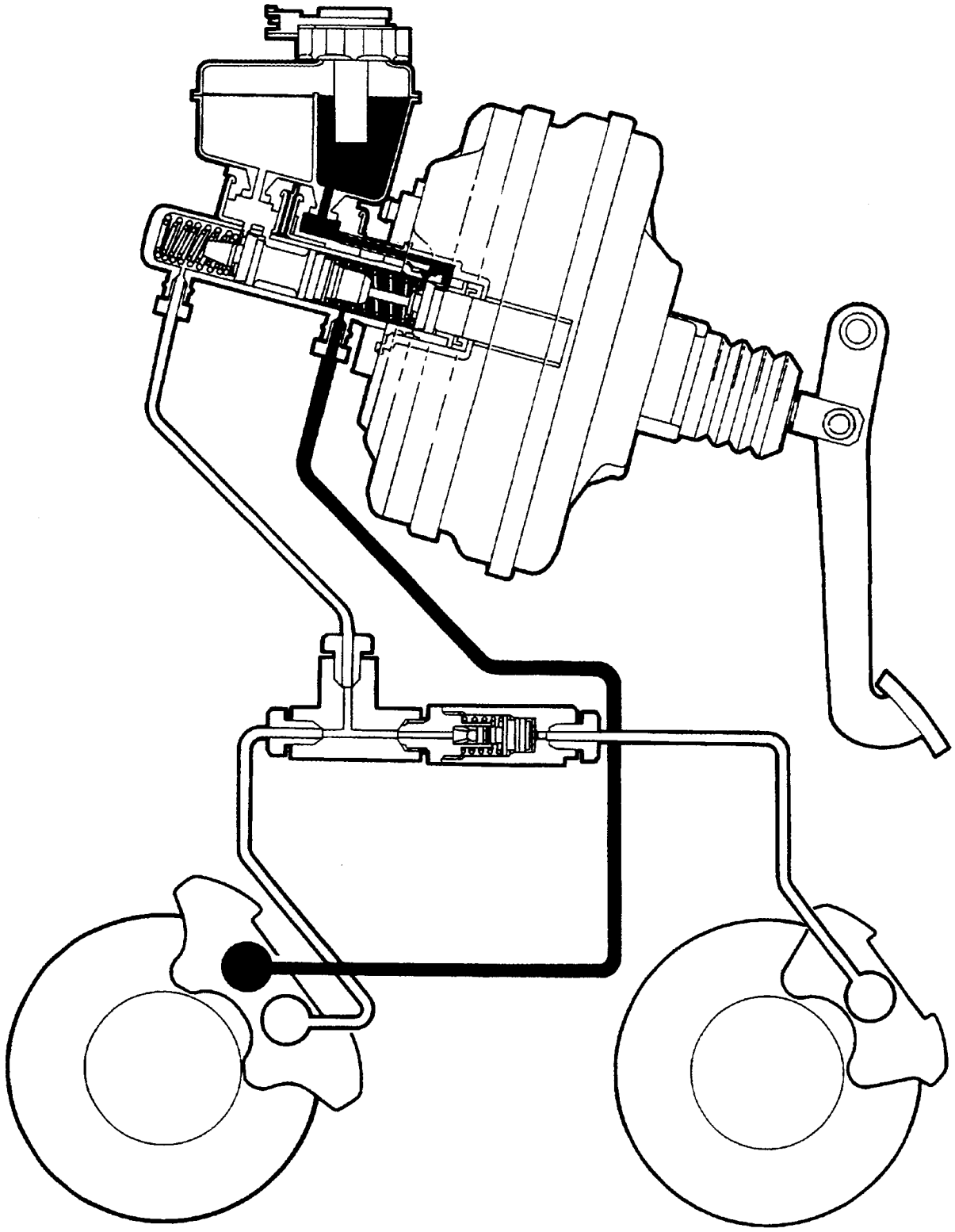
ENSURE that only new fluid is used and that it is taken from a sealed container.

DO NOT flush the brake system with any fluid other than the recommended brake fluid.

The brake system should be drained and flushed at the recommended service intervals.

PRIMARY HYDRAULIC CIRCUIT

SECONDARY HYDRAULIC CIRCUIT



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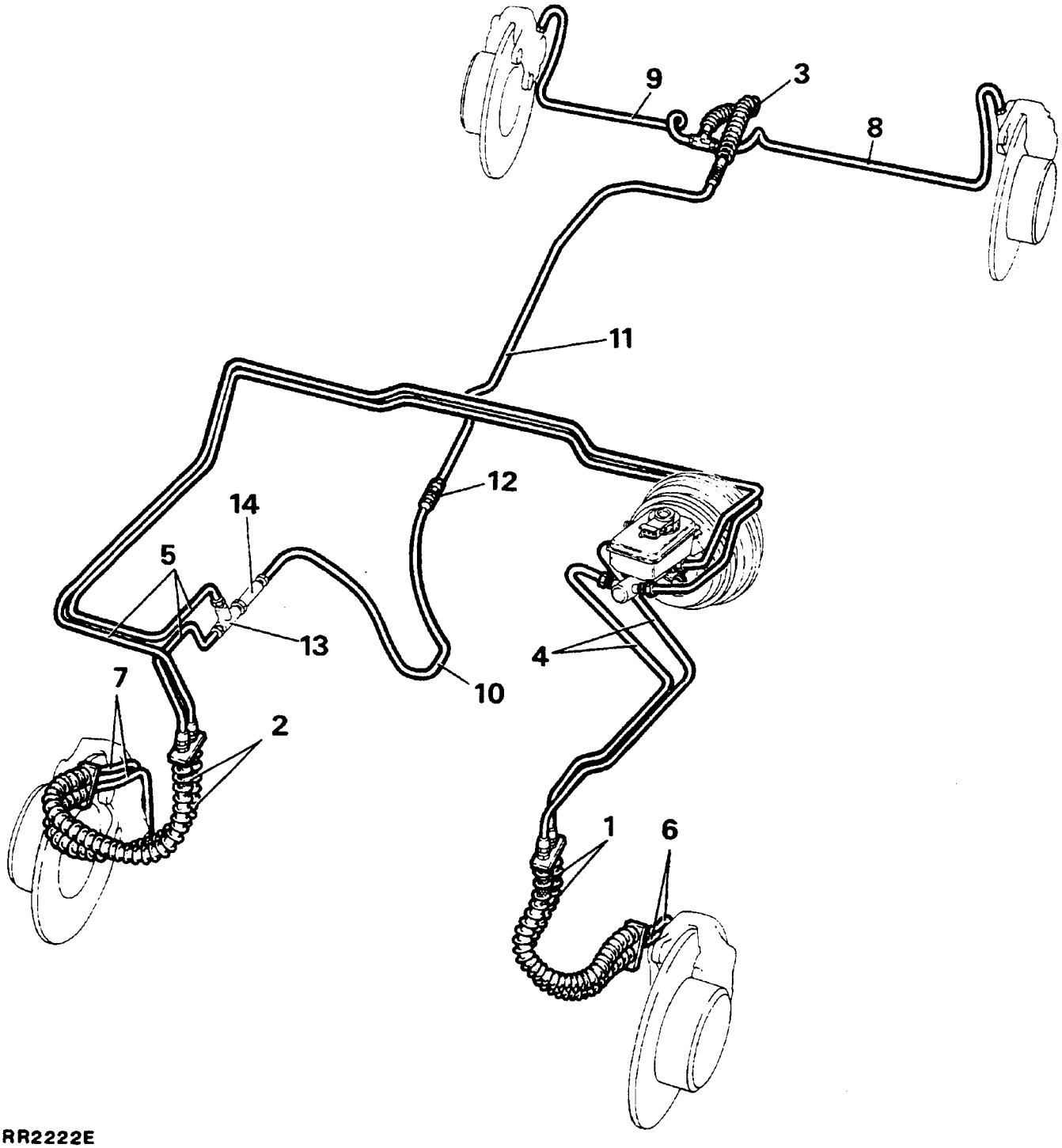

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BRAKE PIPE LAYOUT
Left hand drive

HOSES

1. Front left hand flexible hoses.
2. Front right hand flexible hoses.
3. Intermediate flexible hose.

PIPES

4. Feed to front left hand hose connector.
5. Feed to front right hand hose connector.
6. Feed to front left hand caliper.
7. Feed to front right hand caliper.
8. Feed to rear left hand caliper.
9. Feed to rear right hand caliper.
10. Feed to two way connector.
11. Feed to intermediate hose.
12. Two way connector.
13. Three way connector.
14. Pressure reducing valve.

DATA

Brake calipers - front & rear	Opposed piston type AP4x26
Park brake type	Girling GNSM
Park brake size	254 mm diameter 70 mm wide
Park brake lining material	Ferodo 3611
Friction pad material - front	Asbestos Don 230 Asbestos free Ferodo 3440
Friction pad material - rear	Asbestos Don 230 Asbestos free Ferodo 3440
Brake disc size - front	299 x 14,3 mm dia (11.7 x 0.460 ins)
Brake disc size - rear	290 x 12,7 mm dia (11.4 x 0.443 ins)
Brake pad lining area - front	9800 mm^2 total 19600 mm^2
Brake pad lining area - rear	6600 mm^2 total 13200 mm^2
Park brake lining area	33400 mm^2
Brake fluid specification	Dot 4
Brake servo - type	Girling LSC115
Brake servo vacuum pump (diesel only)	Clayton Dewandre - low inertia aluminium rotary pump driven from camshaft gear

TORQUE FIGURES

	Nm	ft lb	in lb
Brake pipe connections to:			
- Brake calipers	12	9	-
- Jump hoses to brackets	11 - 13.5	8 - 10	-
- Jump hose to three-way connection	12	9	-
-Front caliper jump hoses	11 - 13.5	8 - 10	-
-Rear caliper jump hoses	11 - 13.5	8 - 10	-
Jump hoses to calipers (all)	12	9	-
Brake caliper to swivel pin housing	75 - 88	55 - 65	-
Parking brake linkage to transfer box	26 - 32	19 - 24	-
Brake disc to hubs	65 - 80	48 - 59	-
Bleed screws	9 - 11	-	80 - 100
Servo assembly to pedal box	22 - 25	16 - 19	-
Brake pipes to master cylinder	9 - 11	7 - 8	-
Master cylinder to servo	21 - 29	15 - 22	-

WARNING: Some components on the vehicle such as gaskets and friction surfaces (brake linings and clutch discs), may contain asbestos. Inhaling asbestos dust is dangerous to your health and the following essential precautions must be observed :-

* **Work out of doors or in a well ventilated area and wear a protective mask.**
* **Dust found on the vehicle or produced during work on the vehicle should be removed by vacuuming or by using a well dampened cloth and not by blowing.**
* **Dust waste should be dampened, placed in a sealed container and marked to ensure safe disposal.**
* **If any cutting, drilling etc, is attempted on materials containing asbestos the item should be dampened and only hand tools or low speed power tools used.**

BLEEDING BRAKE SYSTEM

The hydraulic system comprises two completely independent circuits. The rear calipers and the lower pistons in the front calipers form the secondary circuit, while the upper pistons in the front calipers form the primary circuit. The following procedure covers bleeding the complete system, but it is permissible to bleed one circuit only if disconnections are limited to that circuit.

Bleeding will be assisted if the engine is run or a vacuum supply is connected to the servo.

WARNING: IF THE ENGINE IS RUNNING DURING THE BRAKE BLEEDING PROCESS ENSURE THAT NEUTRAL IS SELECTED IN THE MAIN GEARBOX AND THAT THE PARKING BRAKE IS APPLIED.

When bleeding any part of the secondary circuit, almost full brake pedal travel is available. When bleeding the primary circuit only, brake pedal travel will be restricted to approximately half.

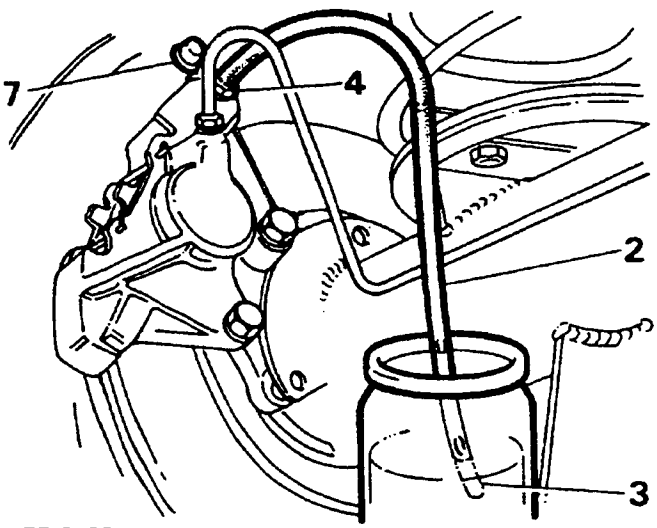
NOTE: When bleeding the system commence with the caliper furthest from the master cylinder and bleed from the screw on the same side as the fluid inlet pipes, then close the screw and bleed from the screw on the opposite side of the same caliper. Tighten the bleed screws to the correct torque value. See section 06

1. Fill the fluid reservoir with the correct grade of fluid, see section 09 lubricants and fluids.

   NOTE: The correct fluid level must be maintained throughout the procedure of bleeding.
2. Connect a bleed hose to the bleed screw on the rear caliper furthest from the master cylinder.
3. Submerge the free end of the bleed hose in a container of clean brake fluid.
4. Loosen the bleed screw one half to three quarters of a turn.
5. Depress the brake pedal fully and allow it to return.

   NOTE: Allow at least five seconds to elapse with the foot off the pedal to ensure that the pistons fully return before operating the pedal again.

6. Repeat instruction 5 until fluid, clear of air bubbles appears in the container, then keeping the pedal fully depressed, tighten the bleed screw.
7. Remove the bleed hose and replace the dust cap on the bleed screw.



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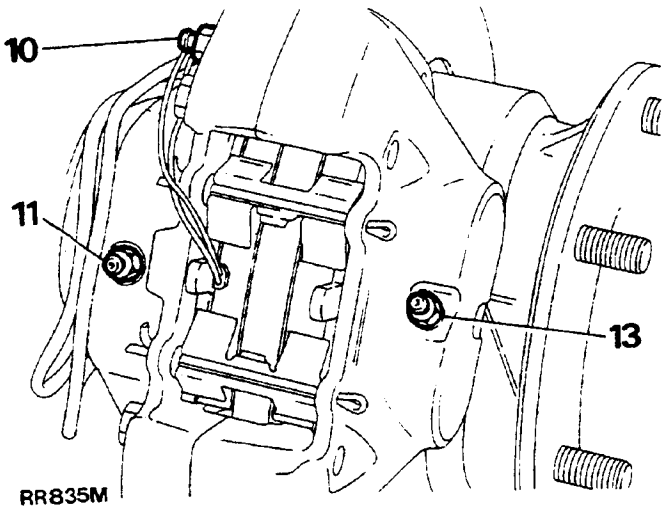
8. Repeat instructions 1 to 7 on the other rear caliper.
9. Remove the front wheel on the side furthest from the master cylinder.
10. Connect a bleed hose to the primary bleed screw on the front caliper furthest from the master cylinder.
11. Connect a bleed hose to the secondary bleed screw on the same side of the caliper as the primary screw.
12. Repeat instructions 3 to 7 as for the front caliper, bleeding from the two screws simultaneously.
13. Connect a bleed hose to the other screw on the front caliper furthest from the master cylinder.



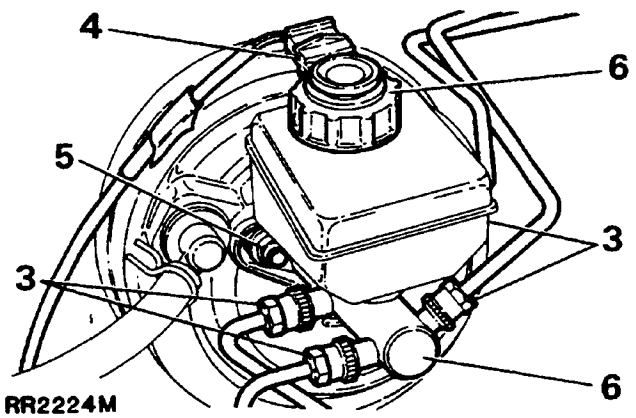
14. Repeat instructions 3 to 7 for the second secondary screw on the front caliper.
15. Refit the front wheel.
16. Repeat instructions 9 to 15 for the front caliper nearest the master cylinder.

MASTER CYLINDER - Lucas Girling - Type 25.4mm AS/AS

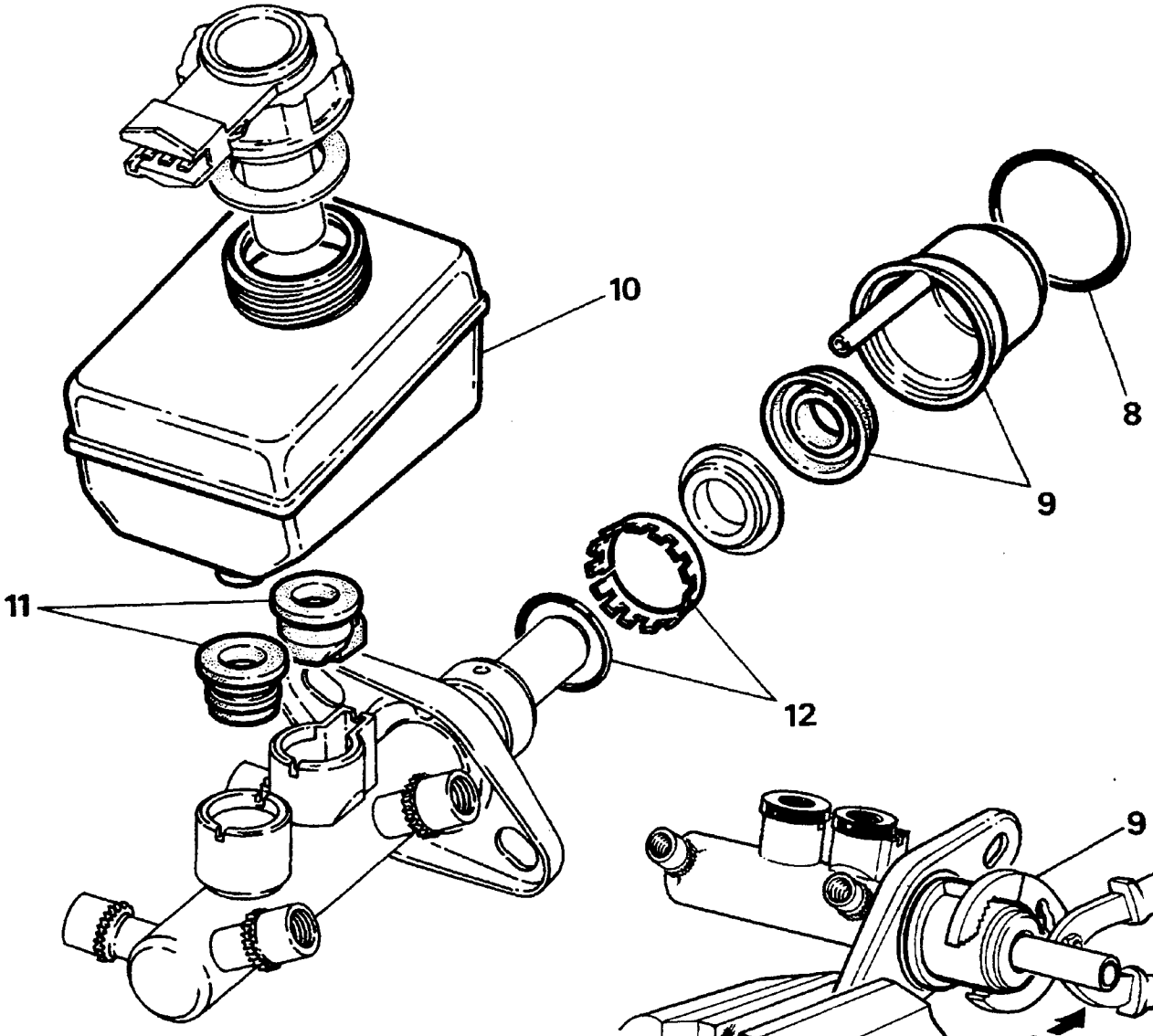
Remove, overhaul and refit

Removing

1. Disconnect the battery negative terminal.
2. Place a suitable container under the master cylinder to catch any brake fluid which may seep from the cylinder when the brake pipes are disconnected from the outlet ports.
3. Thoroughly clean the immediate area around all outlet ports. Remove each of the brake pipes from the master cylinder in turn, sealing each pipe and outlet port with suitable plugs as they are disconnected, to prevent ingress of foreign matter and excessive fluid loss.
4. Disconnect the electrical plug from the low fluid switch located on the reservoir cap.
5. Remove the two nuts securing the master cylinder to the servo unit remove also the spring and plain washers.
6. Detach the the master cylinder from the servo, remove the reservoir cap and drain the brake fluid into a suitable container.



WARNING: Do not use brake fluid previously drained or bled from the system. Carefully dispose of unwanted fluid, if stored in a sealed container, ensure that the container is marked USED BRAKE FLUID.



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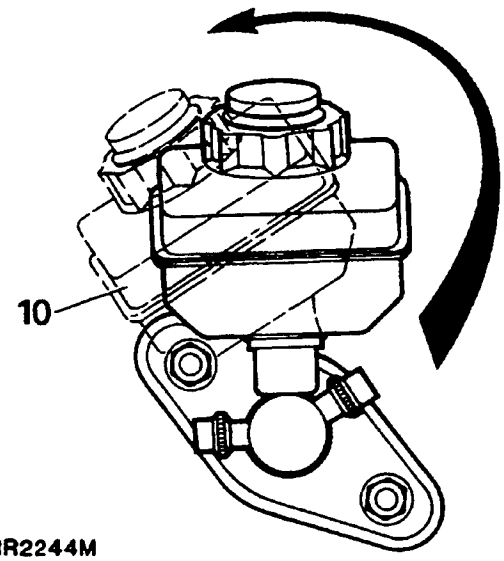
Overhaul

WARNING: Use only clear methylated spirit or unused brake fluid to clean any part of the brake system. DO NOT use petrol, kerosene or other mineral based fluids.

7. Before commencing the overhaul procedure thoroughly clean the master cylinder and inspect the outer surfaces for damage and condition, renew the complete assembly if necessary.
8. Using two soft jaws, one either side of the master cylinder flange, clamp the flange in a suitable vice. remove the water ingress 'O' ring seal from the master cylinder to servo flange and discard.
9. Grip the outside of the transfer housing with asuitable pair of pliers, carefully pull, while working the pliers in a backwards and forwards rocking motion to ease the housing off the master cylinder, discard the housing and vacuum seal.
10. Ease the reservoir out of the master cylinder taking care to ensure that the two outlet ports on the bottom of the reservoir do not become damaged during this process.



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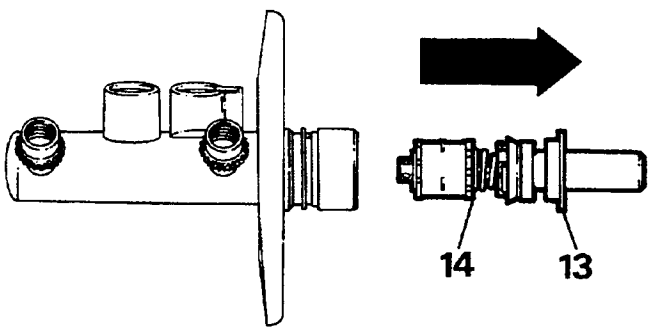
11. Withdraw the two reservoir seals from the master cylinder inlet ports the seals are different and should be noted for assembly,discard both of the seals.
12. Remove the retaining ring and 'O' ring seal from the machined outer surface of the master cylinder, discard both the seal and retaining ring.
13. Remove the guide ring from the mouth of the master cylinder which supports the primary plunger assembly and place to one side, this component is not part of the master cylinder service kit and is to be refitted on assembly of the unit.
14. Pull the primary plunger assembly out of the master cylinder.

NOTE: The primary plunger assembly cannot be broken down any further and is serviced as a complete unit. Discard the assembly.



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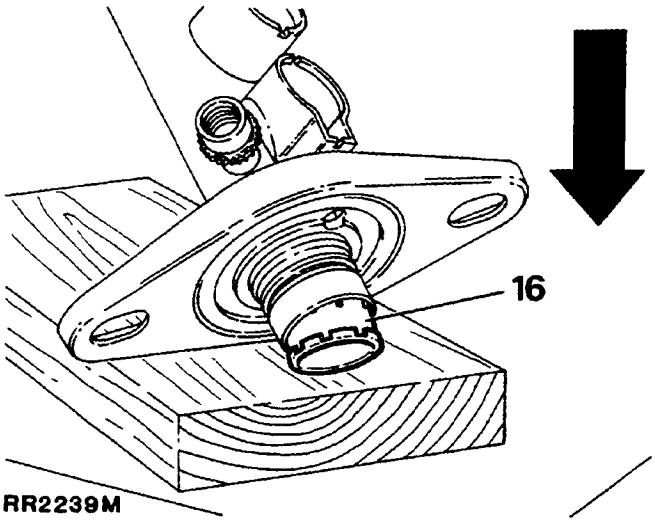
15. The secondary plunger assembly will remain at the bottom of the master cylinder bore, the plunger can be easily expelled by tapping the assembly on a piece of wood until the plunger appears at the cylinder mouth, carefully pull the plunger out of the master cylinder.
16. If the swirl tube was not expelled at the same time as the secondary plunger, repeat the above operation to expel it from the bottom of the master cylinder bore and discard.



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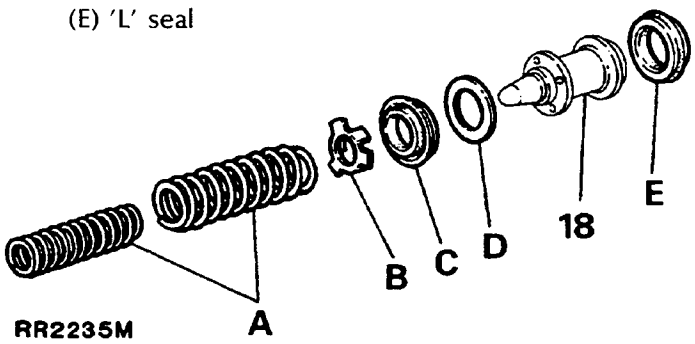
17. Clean all parts with Girling cleaning fluid or unused brake fluid and place the cleaned parts on to a clean sheet of paper. Inspect the cylinder bore and plungers for signs of corrosion, ridges and score marks. Provided the working surfaces are in perfect condition, new seals from a Girling Service repair kit may be used.

Renewing secondary plunger seals

18. Remove the following components from the secondary plunger and discard:

NOTE: A small screwdriver with the end rounded off and polished is required to remove the 'L' seal. DO NOT damage the secondary plunger.

(A) Springs
(B) Seal retainer
(C) Recuperating seal (primary cup)
(D) Washer
(E) 'L' seal



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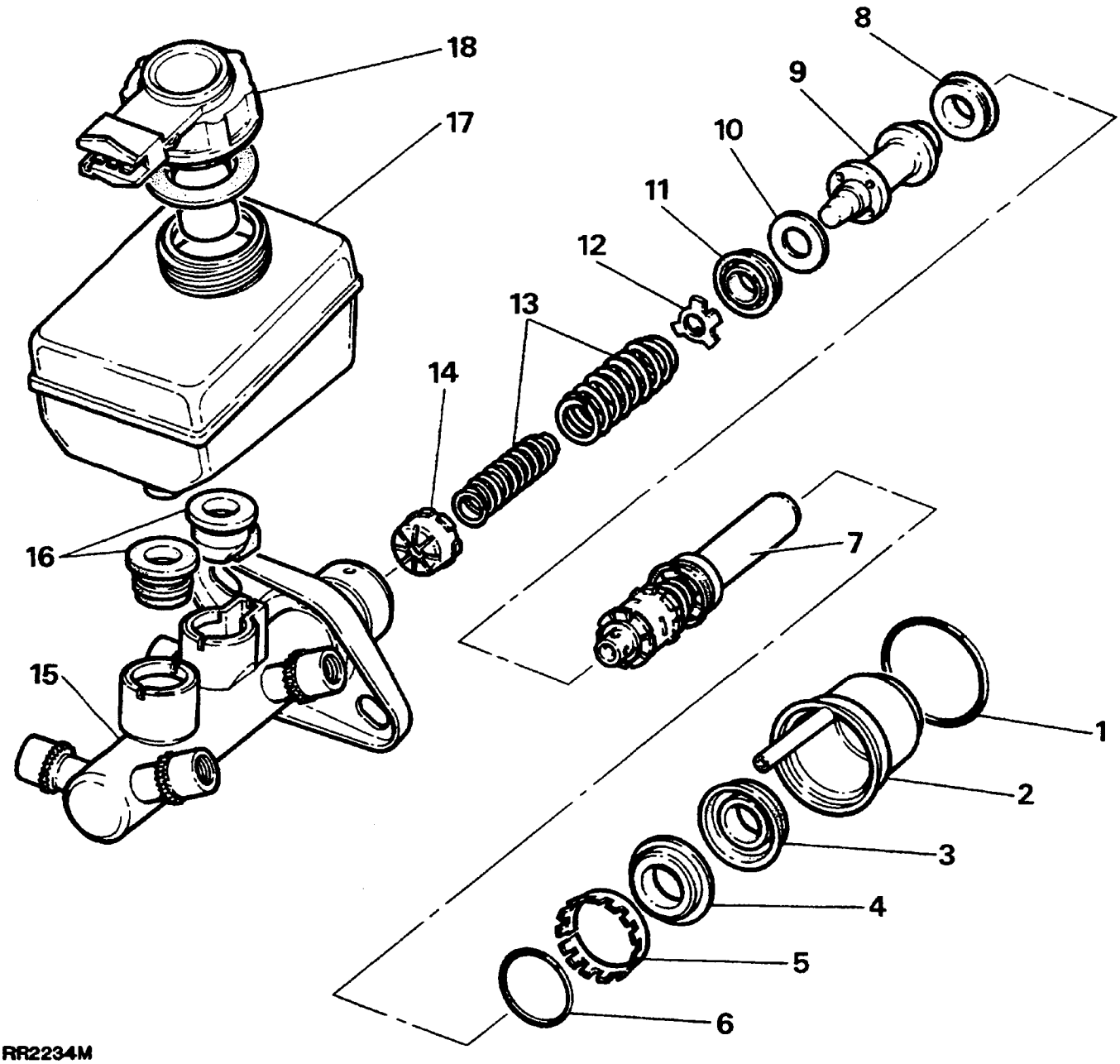

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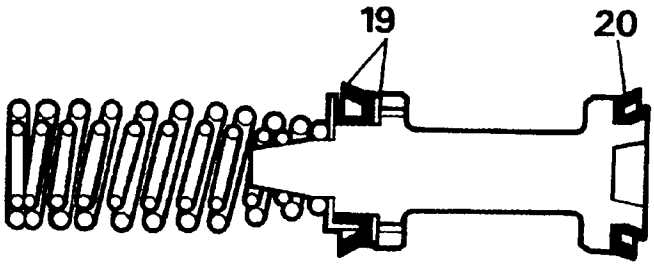
KEY TO MASTER CYLINDER

1. Water ingress seal
2. Transfer housing
3. Vacuum seal
4. Guide ring
5. Retaining ring
6. 'O' ring seal
7. Primary plunger assembly
8. 'L' seal
9. Secondary plunger
10. Washer
11. Recuperating seal (primary cup)
12. Seal retainer
13. Springs (2 off)
14. Swirl tube
15. Master cylinder body
16. Reservoir seals
17. Reservoir
18. Low fluid level switch and cap

NOTE: Thoroughly check that no debris of any description is lodged in any of the fluid passageways and drillings. If debris is found, carefully remove, re-clean the cylinder and re-check.

19. Coat the new seals in unused brake fluid and firstly fit the 'L' seal to the plunger.
20. Fit the washer followed by the recuperating seal. Fit the seal retainer and springs, ensure the springs are correctly seated.



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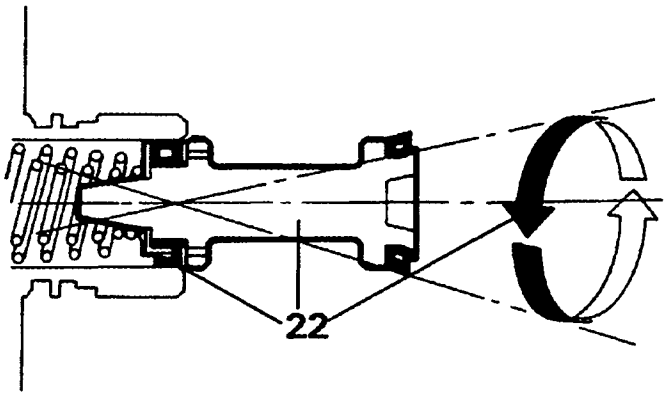
ASSEMBLING THE MASTER CYLINDER

CAUTION: It is important that the following instructions are carried out precisely, otherwise damage could be caused to the new seals when inserting the plungers into the cylinder bore. Generous amounts of new brake fluid should be used to lubricate the the parts during assembly. Never use old fluid or any other form of cleaning and lubricating material. Cleanliness throughout is essential.

21. Fit the new swirl tube to the bottom of the cylinder bore.
22. Lubricate the secondary plunger and cylinder bore. Offer the plunger assembly to the cylinder until the recuperation seal is resting centrally in the mouth of the bore. Gently introduce the plunger with a circular rocking motion, as illustrated. Ensuring that the seal does not become trapped, ease the seal into the bore and slowly push the plunger down the bore in one continuous movement.



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23. Fit the primary plunger assembly using the same method as for the secondary plunger, push the plunger down the bore.
24. Fit the original guide ring to support the primary plunger.
25. Coat a new 'O' ring with brake fluid and fit to its respective groove on the outer location surface of the master cylinder.

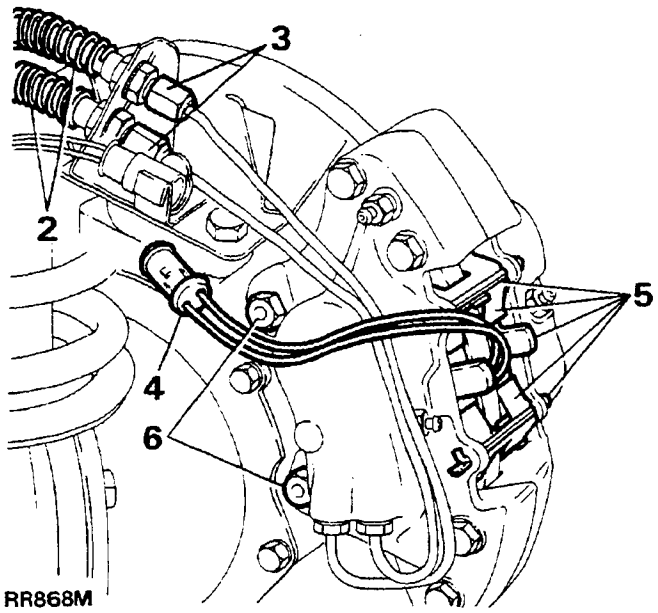
    NOTE: The 'O' ring should not be rolled down the outer location surface of the master cylinder but should be slightly stretched and eased down the cylinder and into its groove. DO NOT OVER STRETCH THE SEAL.

26. Fit a new retaining ring on the outer surface of the master cylinder ensuring that the serrations of the ring are facing the mounting flange.
27. Fit the two new reservoir seals in their respective ports.
28. Fit a new vacuum seal to either the primary plunger or to the bottom of the transfer housing bore, open face of the seal towards the primary plunger guide ring.
29. Lubricate the vacuum seal with brake fluid, fit the transfer housing to the master cylinder, push the housing fully upto the cylinder mounting flange, DO NOT ADJUST THE TRANSFER HOUSING AFTER FITTING.
30. Lubricate a new water ingress seal with brake fluid, slightly stretch the seal and ease it down the housing until the seal is in the correct position between the housing and flange.
31. Roll the reservoir into the top of the master cylinder, reversing the procedure described in instruction 10.

32. Fit the master cylinder to the servo fit the plain and spring washers and secure in position with the two nuts. Tighten to the specified Torque value- see section 06.
33. Fit the brake pipes to the master cylinder and tighten to the specified Torque value- see section 06
34. Top-up the master cylinder with the correct grade of brake fluid (see section 09) and bleed the brake systems.

    WARNING: Do not use brake fluid previously drained or bled from the system. Carefully dispose of unwanted fluid, if stored in a sealed container, ensure that the container is marked USED BRAKE FLUID.

35. Fit the cap with combined low level fluid switch and reconnect the electrical lead. Re-connect the battery.



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REMOVE AND OVERHAUL FRONT BRAKE CALIPERS

Service tool:
18G672-Piston clamp

NOTE: Pad wear warning indicators are incorporated into the front and rear right hand inboard pads.

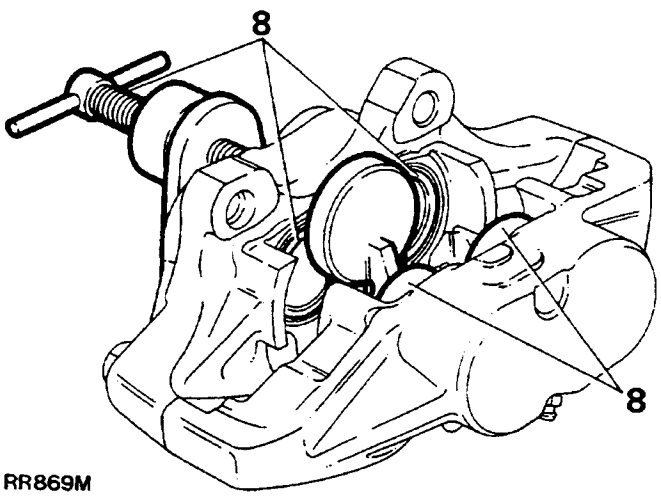
Remove caliper

1. Loosen the front wheel retaining nuts, using a suitable hydraulic floor jack raise the front of the vehicle and lower on to axle stands and remove the wheels.
2. Expose the two flexible brake hoses by moving the coiled protective covering.
3. Using a recognised hose clamp, clamp both hoses to prevent loss of brake fluid, disconnect the rigid brake pipes from the flexible hoses, seal the ends of the hoses and pipe openings to prevent ingress of dirt. (If necessary the two rigid brake pipes to the caliper can be disconnected when the caliper is removed from the swivel pin housing).
4. Disconnect the pad wear warning indicator (front right hand side only).
5. Remove the retaining pins and springs, withdraw the pads. If the same pads are to be refitted, identify them for assembly to their original locations.
6. Remove the two bolts and withdraw the caliper from the disc.

DISMANTLE AND OVERHAUL

Do not separate the caliper halves

7. Clean the outer surfaces of the caliper with brake cleaner.
8. Using special tool 18G672, clamp the pistons in the inboard half of the caliper and gently, keeping fingers clear, and with **CAUTION**, apply air pressure to the fluid inlet port to expel the rim half pistons. Since it is unlikely that all pistons will expel at the same time, regulate the rate with a suitable piece of wood between the appropriate piston and caliper.



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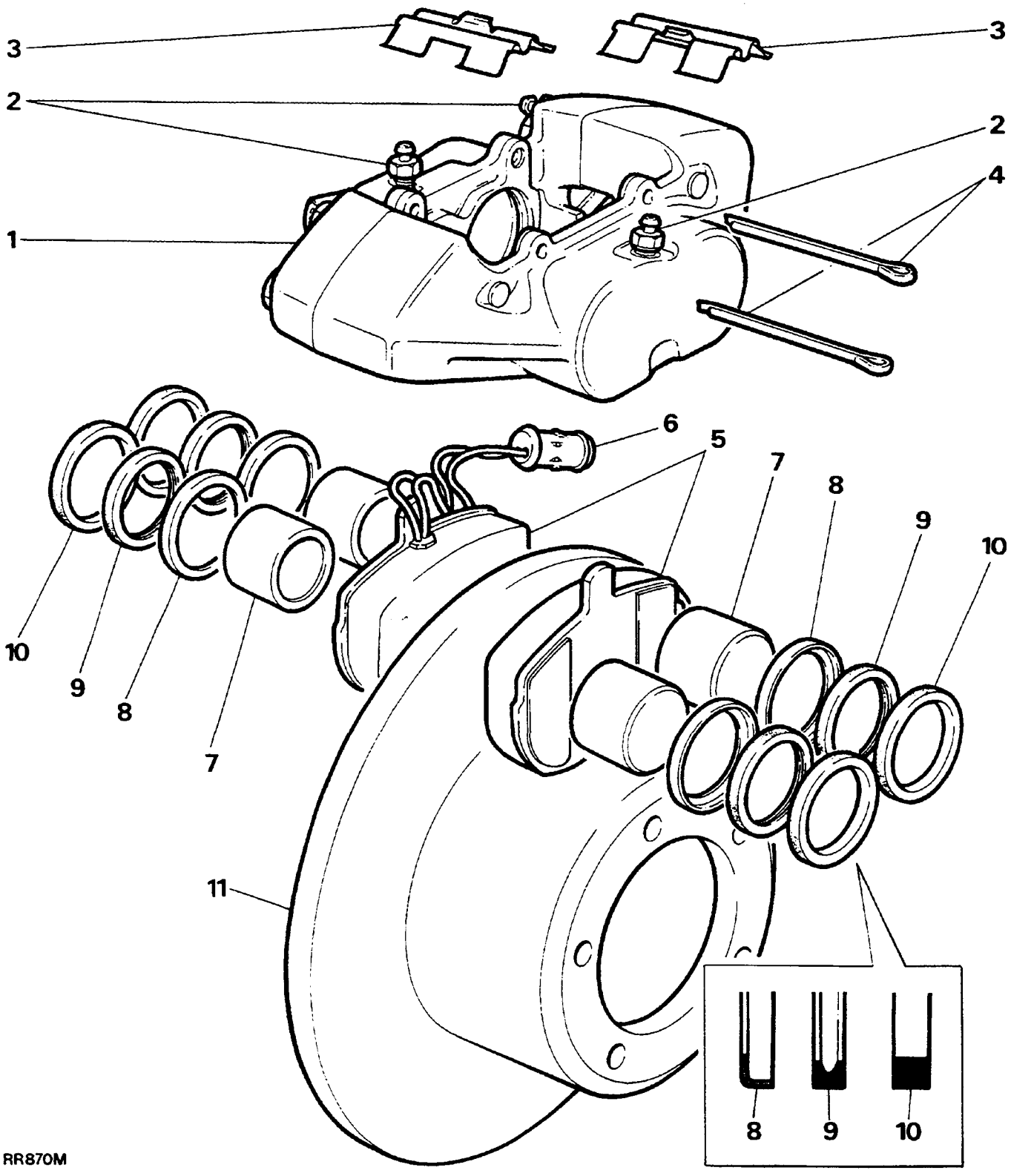
FRONT BRAKE CALIPER ASSEMBLY



KEY TO CALIPER

1. Caliper
2. Bleedscrews
3. Pad retaining springs
4. Retaining pins
5. Friction pads
6. Pad wear indicator plug
7. Piston
8. Wiper seal retainer
9. Wiper seal
10. Fluid seal
11. Brake disc. Ventilated discs are fitted where asbestos free friction pads are used.

9. Finally, remove the pistons keeping them identified with their respective bores.
10. Remove the wiper seal retainer by inserting a blunt screwdriver between the retainer and the seal and lever the retainer carefully from the mouth of the bore.
11. Taking care not to damage the seal grooves, extract the wiper seal and fluid seal.
12. Clean the bores, pistons and particularly the seal grooves with clean brake fluid or brake cleaner only. If the caliper or pistons are corroded or if their condition is not perfect new parts must be fitted.

Assemble outboard pistons

13. Coat a new fluid seal with a suitable disc brake lubricant. Ease the seal into the groove in the bore using only the fingers and ensure that it is properly seated. The fluid seal and the groove are not the same in section so that when the seal is seated it feels raised to the touch at the edge furthest away from the mouth of the bore.
14. Coat the appropriate piston with disc brake lubricant and insert it squarely into the bore by hand only. Do not tilt the piston during insertion and leave approximately 8mm (0.312 inch) projecting from the bore.
15. Coat a new wiper seal with disc brake lubricant and fit it to a new seal retainer. Slide the assembly, seal first, over the protruding piston and into the bore recess. Remove the piston clamp from the mounting half and use the clamp to press home the seal retainer and piston.

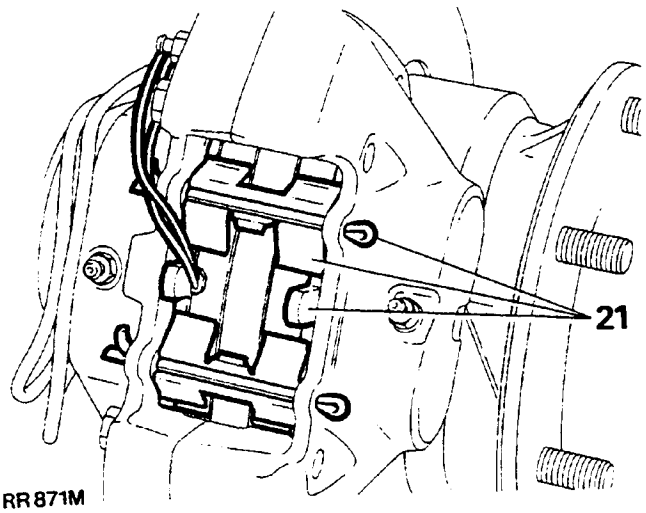
Mounting inboard pistons

16. Clamp the outboard pistons and carry out the same procedure as for removing and fitting the outboard pistons and seals, instructions 8 to 15.

Fit calipers and pads to vehicle

17. Fit the caliper to the axle and secure with the two bolts tightening evenly to the correct torque (see section 06-Torque values).
18. Connect the brake flexible hoses to the caliper and tighten to the correct torque (see section 06-Torque values).
19. Remove the clamps from the hoses.
20. Lightly coat the back and edges of the pads with a suitable disc brake lubricant carefully avoiding the friction material.
21. Insert the pads and retaining springs, secure in position using new retaining pins and open out the ends. Note the correct position of the retaining springs.

NOTE: Ensure that the friction pad with the wear indicator is fitted to the inboard side of the front right hand caliper



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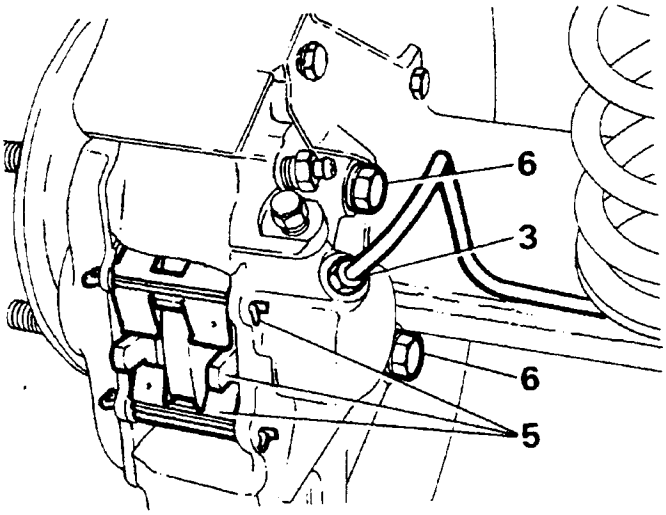
22. Reconnect the pad wear indicator electrical plug.
23. Bleed both the primary and secondary brake systems. (Refer to brake bleeding procedure).
24. When the foregoing instructions have been completed on all calipers, press the brake pedal firmly several times to locate the friction pads.
25. Fit the road wheels, remove the axle stands and finally tighten the road wheel nuts.
26. Road test the vehicle, remembering that if new friction pads have been fitted they are not 'bedded-in' and may take several hundred miles before the brakes are at maximum efficiency.

REMOVE AND OVERHAUL REAR BRAKE CALIPERS

Service tool:
18G672-Piston clamp

Remove caliper

1. Loosen the rear road wheel nuts and jack up the rear of the vehicle, lower onto axle stands and remove the wheels.
2. Using a recognised hose clamp, clamp the flexible brake hose above the rear axle, to prevent loss of fluid.
3. Remove the brake pipe(s) from the rear brake caliper(s). Seal the ends of the pipe to prevent ingress of dirt.
4. Rear right hand caliper only, disconnect the pad wear indicator.
5. Remove the retaining pins and springs and withdraw the pads. If the same pads are to be refitted, identify them for assembly to their original locations.
6. Remove the two bolts and withdraw the caliper from the axle.



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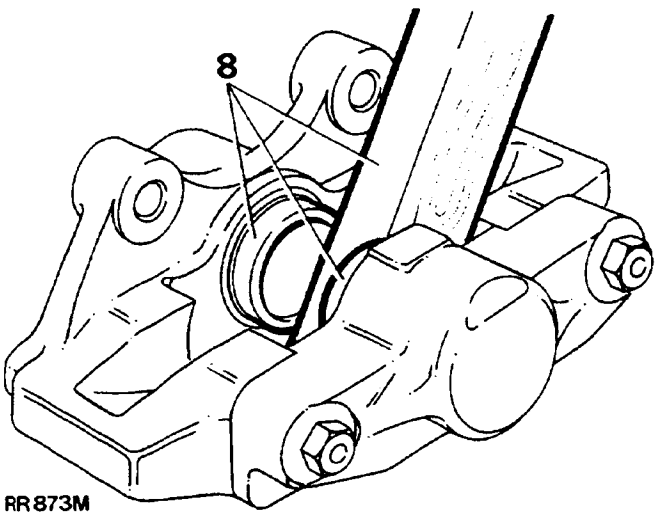
Dismantle and overhaul

Do not separate the caliper halves

7. Clean the outer surfaces of the caliper with brake cleaner.
8. **WITH CAUTION** expel the pistons from their bores by applying air pressure to the fluid inlet port. Since it is unlikely that both pistons will expel at the same time, regulate the rate with a suitable piece of wood inserted between the two pistons.



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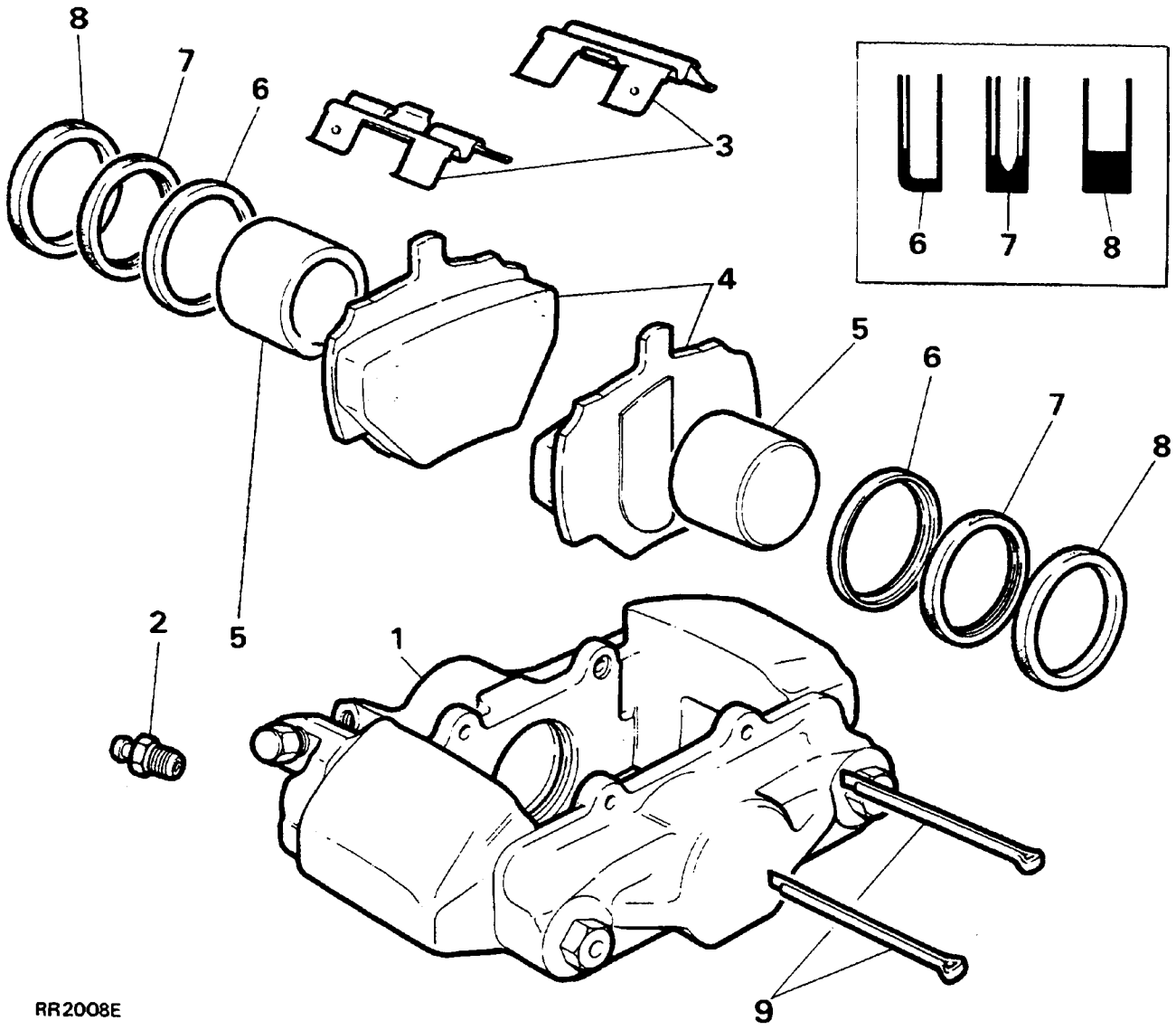
9. Finally, remove the pistons keeping them identified with their respective bores.

10. Remove the wiper seal retainer by inserting a blunt screwdriver between the retainer and the seal and lever the retainer carefully from the mouth of the bore.
11. Taking care not to damage the seal grooves, extract the wiper seal and fluid seal.
12. Clean the bores, pistons and particularly the seal grooves with clean brake fluid or brake cleaner only. If the caliper or pistons are corroded or their condition is not perfect new parts must be fitted.

REAR BRAKE CALIPER ASSEMBLY

LH Rear Caliper illustrated



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KEY TO CALIPER

1. Caliper
2. Bleed screw
3. Pad retaining springs
4. Friction pads
5. Piston
6. Wiper seal retainer
7. Wiper seal
8. Fluid seal
9. Retaining pins

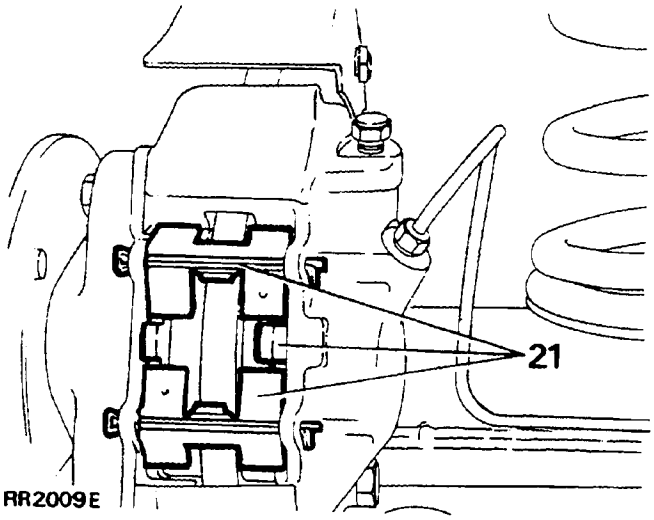
13. Coat a new fluid seal with a suitable disc brake lubricant. Ease the seal into the groove in the bore using only the fingers and ensure that it is properly seated. The fluid seal and the groove are not the same in section so that when the seal is seated it feels raised to the touch at the edge furthest away from the mouth of the bore.
14. Coat the appropriate piston with a suitable disc brake lubricant and insert it squarely into the bore by hand only. Do not tilt the piston during insertion and leave approximately 8mm (0.312 inch) projecting from the bore.
15. Coat a new wiper seal with a suitable disc brake lubricant and fit it to a new seal retainer. Slide the assembly, seal first, over the protruding piston and into the bore recess.
16. Using special tool 18G672-piston clamp, press home the seal retainer and piston.

Mounting inboard piston

17. Carry out the same procedure as for removing and fitting the outboard piston and seals, instructions 8 to 16.

Fit calipers and pads to vehicle

18. Fit the caliper to the axle and secure with the two bolts tightening evenly to the correct torque (see section 06-Torque values).
19. Connect the brake pipes to the calipers and remove the clamp from the flexible brake hose above the rear axles, see section 06-Torque values for brake pipe to caliper tightening torque.
20. Lightly coat the back and edges of the pads with disc brake lubricant carefully avoiding the friction material.
21. Insert the pads and retaining springs, secure in position with new retaining pins and spread the ends. Note the correct position of the retaining springs.



NOTE: Ensure that the friction pad with the wear indicator is fitted to the inboard side of the rear right hand, brake caliper.

22. Reconnect the pad wear indicator electrical multi-plug.
23. Bleed the secondary brake system at the rear calipers, starting at the caliper furthest away from the master cylinder.
24. When the foregoing instructions have been completed on both calipers, press the brake pedal firmly several times to locate the friction pads.
25. Fit the road wheels, remove the axle stands and finally tighten the road wheel nuts, (see section 06 - Torque values).
26. Road test the vehicle, remembering that if new friction pads have been fitted they are not 'bedded-in' and may take several hundred miles before the brakes are at maximum efficiency.

OVERHAUL PARKING BRAKE

WARNING: Do not use an air line to remove dust from the brake assembly. Asbestos dust from the brake linings can be a serious health risk, if inhaled.

DISMANTLING

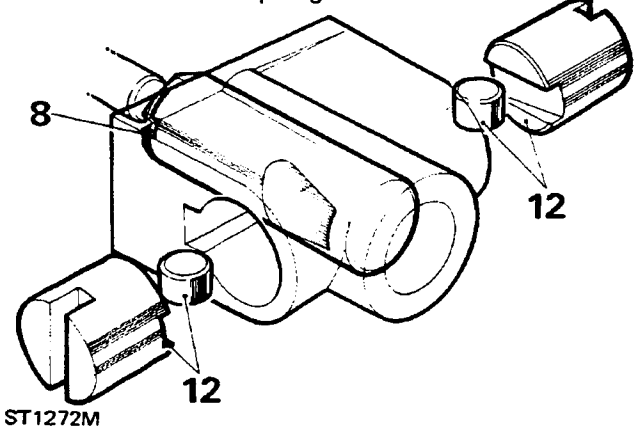
1. Disconnect the battery negative lead. Chock the road wheels for safety. Select any gear in the main gearbox and release the parking brake.
2. Disconnect the drive shaft from the output flange.
3. Loosen off the brake adjuster, remove the two screws and withdraw the brake drum. Inspect the friction surface of the drum, and if excessively scored or oval the drum may be skimmed

NOTE: If drum requires skimming the maximum diameter is 255.65 mm (10.06 in).

4. Remove the cotter pin and clevis pin connecting the parking brake inner cable to the brake actuating lever.
5. Remove the brake shoes complete with pull-off springs. Note position of springs in relation to the shoes.
6. Remove the four bolts securing back plate to transfer box and withdraw the back plate complete with oil catcher. (if fitted)

Remove and overhaul expander assembly

7. Remove the rubber dust cover.
8. Remove the expander and drawlink.
9. Remove the retainer spring plate.
10. Remove the locking plate.
11. Remove the packing plate and withdraw the expander assembly from the back plate.
12. Remove the two plungers and rollers.



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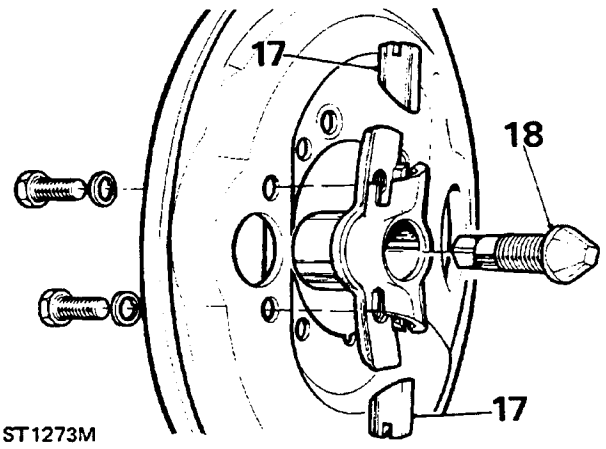
13. Clean all parts in brake cleaner and allow to dry. Examine the components for wear and discard if unsatisfactory.

Assemble expander assembly

14. Grease and fit the expander and drawlink.
15. Grease and fit the plungers and rollers, fitting the plungers with the highest end of the roller groove towards the backplate.

Remove and overhaul adjuster assembly

16. Remove the two bolts and withdraw the adjuster assembly from the back plate.
17. Remove the plungers.
18. Screw the adjuster cone inwards to remove from the housing.



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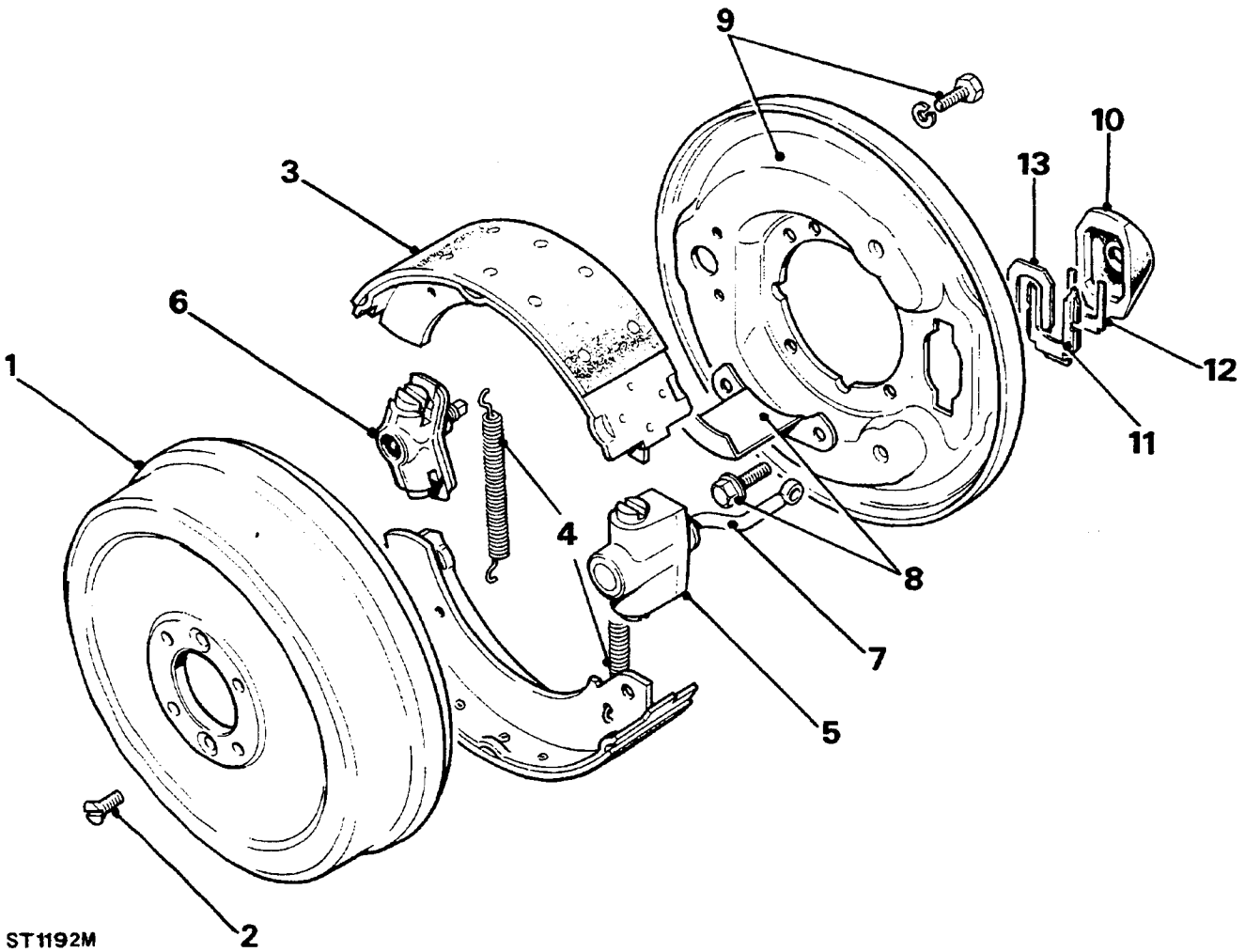
19. Thoroughly clean the parts in brake cleaner and discard any unsatisfactory components.

KEY TO PARKING BRAKE

1. Brake drum
2. Brake drum retaining screws
3. Brake shoes
4. Brake shoes pull-off springs
5. Expander assembly
6. Adjuster assembly
7. Drawlink
8. Oil catcher (Deleted June 1993)
9. Back plate and retaining bolts
10. Dust cover
11. Locking plate
12. Packing plate
13. Spring plate



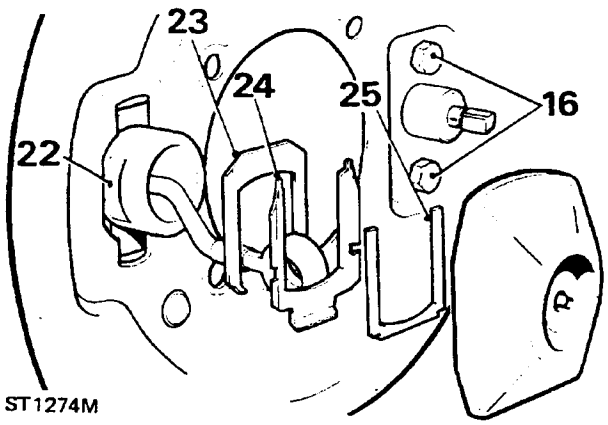
Assembly adjuster assembly

20. Grease and screw in the adjuster cone.
21. Grease and fit the adjuster plungers and align the chamfered ends with the adjuster cone. Note that the two plungers are identical and can be fitted to either bore. Secure the assembly with a rubber band to prevent the plungers falling out.

ASSEMBLE

NOTE: If the brake linings are oil-soaked, fit new brake shoes. Check and if necessary fit a new output shaft oil seal.

22. Position the expander assembly on the inside of the back plate and secure with the following plates at the rear of the back plate.
23. Spring plate.
24. Locking plate.
25. Packing plate.
26. Fit the rubber dust cover.



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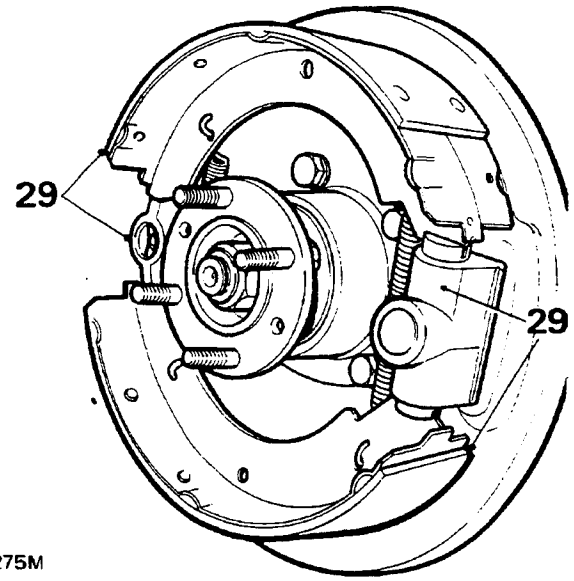
27. Fit the adjuster assembly to the back plate with the two bolts but do not fully tighten at this stage.
28. Fit the back plate assembly and oil catcher (if fitted) to the transfer box with the four bolts and tighten to the correct torque (see section 06-Torque values).
29. Fit new pull-off springs to the brake shoes and fit to the back plate.

NOTE: That the fully lined end of the lower shoe must be toward the expander assembly and the fully lined end of the upper shoe towards the adjuster assembly.



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30. Fit the brake drum and tighten the two screws to the correct torque (See Section 06 Torque Values)
31. Connect the actuating lever to the inner parking brake cable using a new clevis pin, washer and cotter pin.
32. Turn the adjuster cone fully in and tighten the two retaining bolts left loose in instruction 27.
33. Slacken off the adjuster two 'clicks' and firmly apply and release the parking brake lever to centralise the shoes. The drum should then rotate freely.
34. Adjust the parking brake cable lock nuts until the parking brake lever is fully operational on the second or third notch of the parking brake rachet.
35. Connect the drive shaft and evenly tighten the retaining nuts to the correct torque (see section 06-Torque values).
36. Remove chocks from wheels and connect the battery.

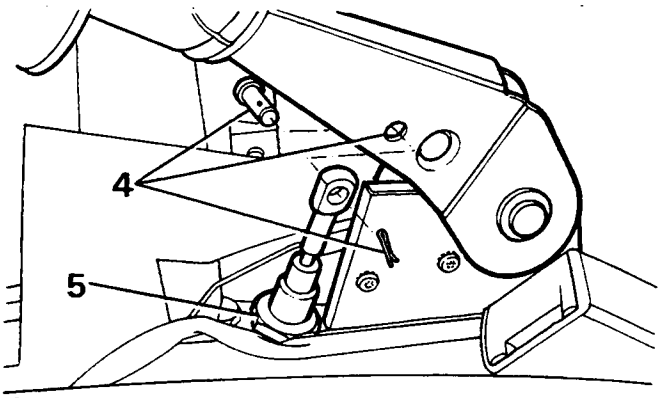
RENEW PARKING BRAKE CABLE

Removing cable

1. Set the vehicle on a level surface, chock the road wheels and select any gear in the main gearbox.
2. Disconnect the battery negative lead. Release the parking brake.

From inside the vehicle

3. Remove the console between the two front seats to gain access to the parking brake lever.
4. Remove the cotter pin and clevis pin from the parking brake lever.
5. Release the nut securing the parking brake outer cable. Slide the nut up the cable and push the inner and outer cable through the floor panel to the underside of the vehicle.



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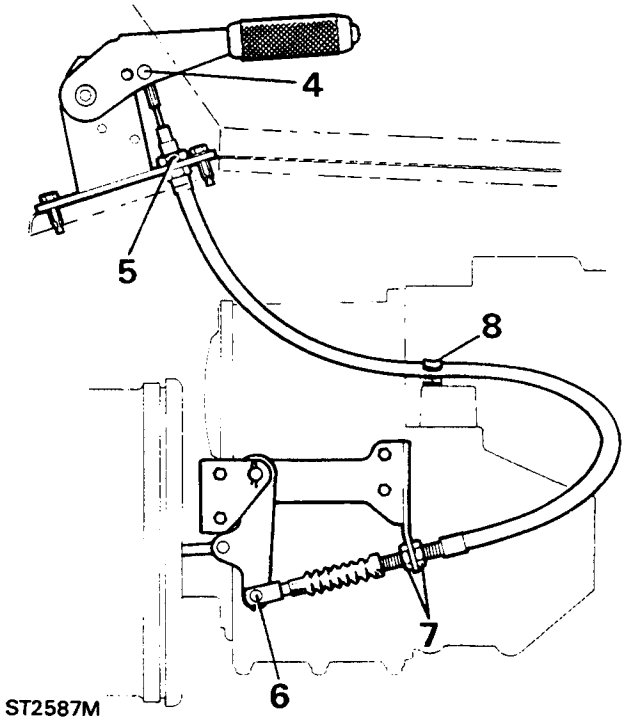
From underneath the vehicle

6. Remove the cotter pin, plain washer and clevis pin securing the adjustment link to the brake drum actuating lever.
7. Release the locknuts securing the parking brake outer cable to the retaining bracket.
8. Release the outer cable from the 'P' clamp located on top of the transfer gearbox, and withdraw the cable assembly from the vehicle.



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Fit new cable

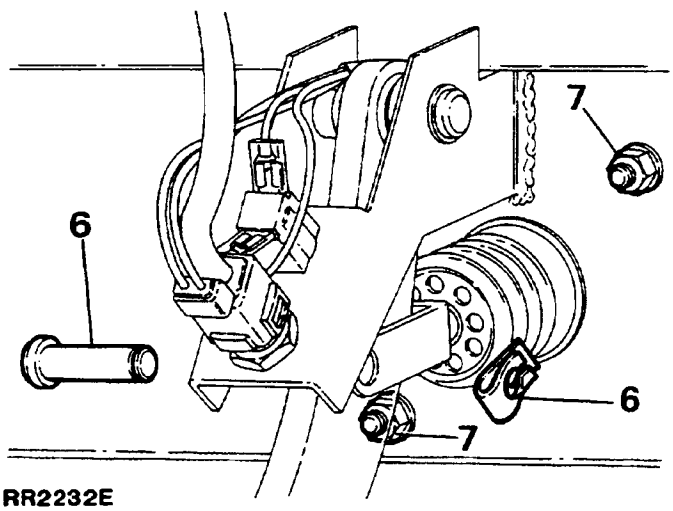
9. Feed the parking brake cable assembly through the floor opening and secure the outer cable in position with the retaining nut.
10. Secure the cable to the parking brake lever, using a **new** cotter pin.
11. Secure the outer cable into the 'P' clamp.
12. Position the outer cable into the retaining bracket bolted to the side of the transfer gearbox and loosely secure in position with the two outer cable lock nuts.
13. Reconnect the outer cable to the brake drum actuating lever. Fit the clevis pin, plain washer and **new** cotter pin.
14. Rotate the brake drum adjuster clockwise until the brake shoes are fully expanded against the drum.
15. Tighten the two brake cable outer lock nuts to secure the cable to its mounting bracket.
16. Apply the parking brake, and loosen the brake drum adjuster until the parking brake lever fully operates the brake shoes on the second or third notch of the parking brake ratchet.
17. Refit the centre console.

RENEW SERVO ASSEMBLY

NOTE: Other than replacing the filter, non-return valve and grommet, the servo is not a serviceable component, in the event of failure or damage fit a new unit.

Removing

1. Disconnect the battery negative terminal.
2. Disconnect the electrical plug to the low fluid level switch.
3. Thoroughly clean the immediate area around all master cylinder outlet ports. Remove each of the brake pipes from the master cylinder in turn, sealing each pipe and outlet port as they are disconnected with suitable plugs, to prevent ingress of foreign matter and excessive fluid loss.
4. Disconnect the vacuum supply hose to the servo.
5. From inside the vehicle remove the lower dash panel to gain access to the spring clip securing the servo push rod to the brake pedal assembly.
6. Release the spring clip and remove the clevis pin securing the servo push rod to the brake pedal.
7. Remove the two nuts and plain washers securing the servo to the bulkhead pedal box.



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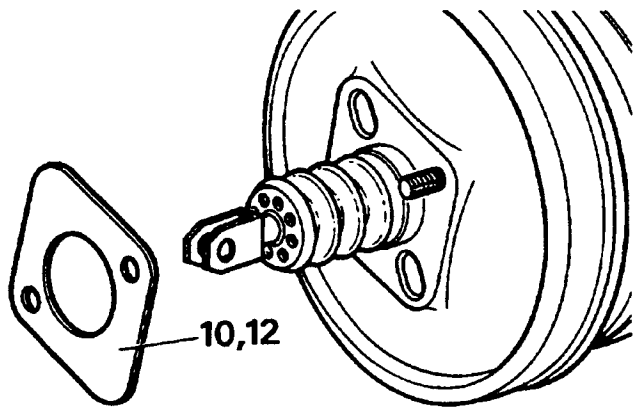
8. From within the engine compartment withdraw the servo and master cylinder assembly.
9. Remove the cap from the reservoir and drain the brake fluid into a suitable container. If the master cylinder assembly can be kept horizontal it will not be necessary to drain the fluid.

WARNING: Do not use brake fluid previously drained or bled from the system. Carefully dispose of unwanted fluid, if stored in a sealed container, ensure that the container is marked USED BRAKE FLUID.

10. Detach the spacer from the pedal box mounting face of the servo, it is important that the spacer is fitted to the mounting face of the new servo to ensure that stringent pedal to servo operating dimensions are maintained.



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11. If a new servo is being fitted it will be necessary to remove the master cylinder from the existing servo and refitted to the new unit.

Refitting

12. Fit the spacer previously removed from the old servo, to the new servo.
13. Fit the servo to the pedal box assembly.
14. From inside the vehicle lightly grease the brake pedal around the area that the servo push rod pivots.
15. Fit the push rod to the brake pedal and secure in position with the clevis pin and clip.

16. Fit the plain washers and secure the servo with the two nuts. Tighten the nuts to the specified Torque value-see section 06.
17. Refit the lower dash panel.
18. Fit the master cylinder to the servo, refit the plain and spring washers and secure the master cylinder to the servo with the two nuts. Tighten the nuts to the specified torque-see section 06 -Torque values.
19. Remove the sealing plugs, fitted to the master cylinder outlet ports during the removal procedure and refit the brake pipes to their respective ports. Tighten the brake pipes to the correct torque-see section 06-Torque values.
20. Refit the vacuum supply hose.
21. Fill the master cylinder to between the 'MAX' and 'MIN' level markings with the correct grade of brake fluid-see section 09.
22. Bleed the brake systems.

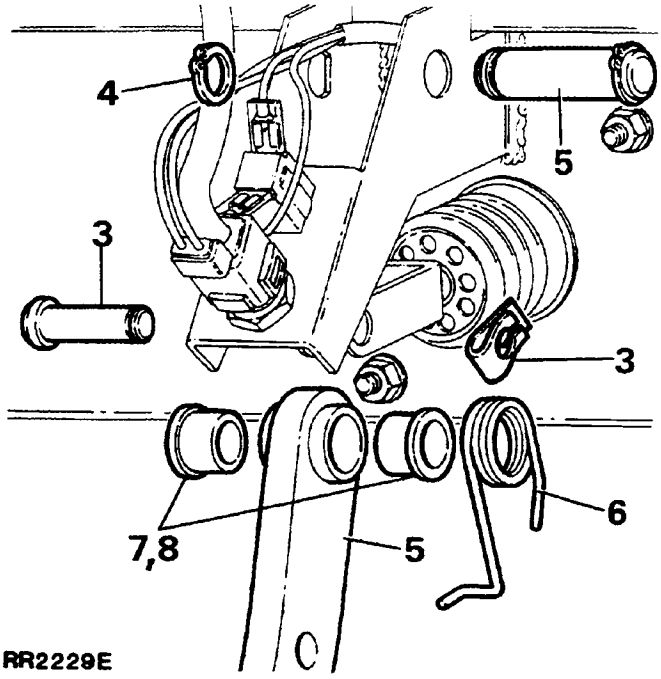
OVERHAUL BRAKE PEDAL

Remove

1. Disconnect the battery negative terminal.
2. From inside the vehicle remove the lower dash panel to gain access to the pedal assembly.
3. Release the spring clip ad remove the clevis pin securing the servo push rod to the brake pedal.
4. Remove the circlip from the 'D' shaped end of the pedal shaft.
5. Remove the pedal shaft from the pedal assembly and withdraw the pedal from the pedal box.
6. Remove the return spring from the pedal.

Overhaul

7. Remove the bushes from the pedal pivot tube.
8. Press new bushes into the pedal pivot tube. If necessary ream out the bushes to 15.87mm plus 0.05mm (.625 in plus .002in).
9. Lightly grease the bushes.



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Refitting

10. Fit the return spring to the pedal.
11. Fit the pedal to the pedal box assembly and refit the pedal shaft.
    Secure the pedal assembly in position with a new circlip.
12. Lightly grease the servo push rod and secure in position with the clevis pin and clip.
13. Refit the lower dash panel and reconnect the battery.